2.—THE ESSENTIAL OILS OF THE WESTERN AUSTRALIAN EUCALYPTS.

PART *VI.*

THE OIL OF *EUCALYPTUS CONCINNA*, MAIDEN ET BLAKELY.

By G. E. MARSHALL and E. M. WATSON.

Read 11th July, 1939; published 1st July, 1940.

E. concinna is described by J. H. Maiden (1). The material from which the species was described was obtained by the Elder Exploring Expedition of 1891-92 in the vicinity of Camp 49. This locality, which marked the only occurrence of *E. concinna* known to Maiden, is 155 miles due north of Rawlinna and about 185 miles east of Laverton. The species is now known to occur at least as far westwards as Mulline, about 30 miles roughly south-west of Menzies, and thence southwards beyond Southern Cross to Mount Holland, about 70 miles south of the eastern railway.

The species occurs both as a mallee and in the form of small slender trees. The leaves are fairly light, glossy green in colour and are narrow lanceolate in shape; the lamina is herbaceous and is freely dotted with oil glands; the venation, which is obscure, is pinnate, the lateral veins leaving the midrib at an angle of about 45°; the intramarginal vein is very close to the margin and is indented to meet the lateral veins. The bark is smooth and becomes rough on aging. The heart wood is pale brown in colour.

The material used in this investigation was obtained from mallees, and was collected, in August, 1938, about seven miles south of Laverton through the courtesy of Mr. R. A. Hobson and Mr. K. R. Miles of the Geological Survey. It was identified by Mr. G. R. W. Meadly, the acting Government Botanist.

The oil distilled fairly rapidly and was obtained in from 1.7 to 1.8 per cent. yield calculated on air-dried weight. It is pale yellow in colour and has a slightly irritant odour. Its physical constants are those of the typical cineol oils, and its solubility in alcohol shows a low proportion of hydrocarbons. The cineol content is nearly 65 per cent. and pinene is only present in small amount; free acids and esters are also present in only small proportion, but alcohols, the greater part of which is geraniol, make up somewhat more than 15 per cent. of the oil. Aldehydes are present in rather more than usual amount and are principally low boiling. Aromadendrene is present in relatively small amount and phellandrene is absent. Nearly 76 per cent. of the oil is distilled between 165° and 195° and this rectified oil complied with the requirements of the British Pharmacopoeia for medicinal eucalyptus oil.

EXPERIMENTAL.

The oil was obtained in from 1.7 to 1.8 per cent. yield and had the following physical constants at 20°:—Specific gravity 0.923; refractive index, 1.4650; specific rotation,—0.18°; soluble in 2 volumes of 70 per cent. alcohol. Its acid value was 1.2; its ester values were 7.5 (cold) and 8.0 (hot), corresponding respectively to 2.6 per cent. of geranyl acetate and 2.8 per cent. of total esters calculated as $C_{12}H_{20}O_2$. The ester values of the acetylated oil were 54.5 (cold) and 64.1 (hot), corresponding respectively to 12.9 per cent. of geraniol and 15.4 per cent. of total alcohols calculated

as $C_{10}H_{18}O$. The cineol content was 64.4 per cent., whilst aldehydes were present to the extent of 0.12 milligram mol. per gram of oil. The oil gave a bright yellow colour with ferric chloride and gave the usual colour reactions for aromadendrene.

The oil was redistilled at a pressure of 21 mms. and the fractions which were separated had the following properties:—

Fraction.	Boiling Range.	Amount.	Specific Gravity.	Refractive Index.	Specific Rotation.
		per cent.			
1	Up to 60°	4.2	0.893	1.460	+ 20.0°
2	60°—64°	8.3	0.900	1.461	+ 14.7°
3	64°—68°	41.7	0.911	1.461	+ 8.3°
4	68°—76°	27.4	0.923	1.461	— 2.1°
5	76°—100°	6.9	0.952	1.477	— 23.4°
6	100°—107°	4.6	0.972	1.493	— 29.3°

The formation of white insoluble material, which has been frequently noticed in these investigations, was again noted; the separation commenced at about 75° and increased slowly during the distillation. The small amount (0.39 per cent.) of this material formed was separated from the residue by addition of ether and filtration.

Fractions 1 and 2 were both very pale yellow in colour and had a slightly irritant odour. Fraction 1 contained appreciable amounts of free acid and of low-boiling aldehyde, whilst fraction 2 contained aldehyde and cineol. The two fractions were mixed, washed successively with concentrated resorcinol solution, aqueous alkali, and water, then dried and redistilled. From the fraction distilling between 155° and 160°, pinene nitrosochloride was isolated.

Fractions 3 and 4 were practically colourless and had a non-irritant, camphoraceous odour. The combined fractions made up 69 per cent. of the oil and, on mixing, had the following physical properties:—Specific gravity, 0.915; refractive index, 1.4610; specific rotation, +4.4°; soluble in 2.5 volumes of 70 per cent. alcohol. The cineol content of the mixture was 77 per cent., and the aldehyde content was 0.01 milligram molecule per gram, which is about one-tenth of the maximum aldehyde content permitted by the British Pharmacopoeia.

Fractions 5 and 6 were colourless and pleasant smelling. They had cold saponification values of 11.2 and 21.6 respectively, corresponding to 3.9 and 7.6 per cent. of geranyl acetate. The corresponding hot saponification values were 15.0 and 32.0 which are equivalent to 5.2 and 11.2 per cent. of the total esters calculated as $C_{12}H_{20}O_2$.

The residue slowly developed a purple colour when treated with ferric chloride.

The authors wish to express their thanks to Mr. G. R. W. Meadly, Mr. R. A. Hobson and Mr. K. R. Miles for their assistance.

REFERENCE.

(1) Maiden, J. H.: **Critical Revision of the Genus Eucalyptus.** 1933, Vol. 8, p. 49.

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